

REMARKS

Applicants respectfully request the entry of the foregoing amendments and consideration of the remarks.

Numbering of the Claims

Applicants notice that the Examiner has renumbered the claims that were added to the application in Applicants' last response from 24-58 to 30-64. The Examiner's numbering is correct, and Applicants thank the Examiner for making the correction. Claims 30-64 are pending in the application. Claims 1-29 were previously canceled.

Claims 30-33, 36, 37, 39-45, 48, 51-57, 60, 63, and 64 were rejected. Claims 34, 35, 38, 46, 47, 49, 50, 58, 59, 61 and 62 were objected to. Claim 32 is amended herein to correct an informality. No claims have been allowed.

Allowable Subject Matter

Claims 34, 35, 38, 46, 47, 49, 50, 58, 59, 61 and 62 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form to include all of the limitations of their respective base claims and any intervening claims.

Claim Rejections under 35 U.S.C. § 102

Claims 30-33, 36, 37, 39-45, 48, 51-57, 60, 63, and 64 were rejected under 35 U.S.C. § 102 (b) as being anticipated by Meehan (U.S. Patent No. 5,347,536). Applicants respectfully traverse the rejection. Applicants respectfully assert that Meehan does not teach every limitation of any one of the independent claims 30, 41, or 53.

The section of Meehan cited in the Final Office Action is reproduced below.

FIG. 14 illustrates an enhancement to the system of FIG. 13 in which a shape correction feature is added to the tracking error processor based upon a de-weighted contribution of the cross-correlation function obtained from a "late" correlator 185. For this purpose, a late multiplier 190 multiplies an undelayed version of the model code by the demodulated

incoming signal to produce late cross-correlation products, which the late correlator 185 sums to produce a late cross-correlation function. The in-phase component I_L of the late cross-correlation function (the I output of the late correlator 185) is processed by the tracking error processor 150 in the same manner as the tracking error processor 150 processes the I_E component as described in FIG. 13, with a key difference that the final result is de-weighted. Specifically, the correlation shape correction feature added to the tracking error processor includes a memory 155' storing the constant k . A multiplier 160' multiplies the I output of the prompt correlator 135, i.e., I_P , by k to produce kI_P and an adder 165' subtracts the resulting product from I_L , the I output of the late correlator 140. The resulting difference, $I_L - kI_P$, is divided at a divider 170' by I_P , the I output of the prompt correlator 135. The final result, $W_L(I_L - kI_P)/I_P$, is obtained by a multiplier 180' multiplying the output of the divider 170' by a "late" weight factor W_L smaller than the "early" weight factor W_E . The result is the multipath correlation shape correction, and is subtracted at a summing node 195 from the delay tracking error whose computation was described herein with reference to FIG. 13.

In the preferred embodiment, $W_E=1$, $W_L=0.3$ and $k=0.585$.

(Meehan, column 10, lines 4-36).

Applicants submit that Meehan operates on cross-correlation products to produce a cross-correlation function. The cross-correlation function, rather than the cross-correlation product, is then used in a formula to determine the tracking error. Thus Meehan fails to teach detecting multipath error based on at least one relationship between elements of cross-correlation products, as claimed.

As the passage above describes, Meehan uses cross-correlation products to produce a cross-correlation function with an in-phase component. Then, "The in-phase component I_L of the late cross-correlation function (the I output of the late correlator 185) is processed by the tracking error processor 150 in the same manner as the tracking error processor 150 processes the I_E component as described in FIG. 13, with a key difference that the final result is de-weighted." (column 10, lines 13-18). The final tracking error result ($W_L(I_L - kI_P)/I_P$) is obtained only after multiplying the difference of the weighted in-phase component of the late

correlation function and the weighted in-phase component of the prompt correlation function, and dividing the result by the in-phase component of the prompt correlation function (column 10, lines 27-30). Three stored constants are used in the disclosed algorithm, $W_E=1$, $W_L=0.3$ and $k=0.585$. Therefore, Meehan does not teach detecting a multipath error in a received signal based on at least one relationship between an amplitude of the early correlation product, an amplitude of the prompt correlation product and an amplitude of the late correlation product. Instead, Meehan first processes the cross-correlation products to obtain a cross-correlation function, which is weighted and used in the equation $W_L(I_L - kI_P)/I_P$.

In contrast, the claimed invention, as recited in claim 30 for example, includes detecting a multipath error in the received signal based on at least one relationship between an amplitude of the early correlation product, an amplitude of the prompt correlation product and an amplitude of the late correlation product. Applicants respectfully submit that Meehan fails to teach detecting a multipath error based on at least one relationship between the amplitudes of the correlations products as claimed. Therefore, the invention of claim 30 is not anticipated by Meehan.

Dependent claims 31-52 include further limitations on claim 30. Applicants therefore respectfully submit that claims 31-52 are likewise allowable over the prior art.

Independent claim 41 recites an error detector coupled to the receiver and to the code generator, wherein the error detector detects code phase error in the received signal based on at least one relationship between a first correlation product of an early code phase delayed version of the code replica and the received signal, a second correlation product of a prompt code phase delayed version of the code replica and the received signal, and a third correlation product of a late code phase delayed version of the code replica and the received signal. Meehan fails to teach or suggest the limitation of claim 41. Meehan does not teach detecting code phase error in the received signal based on at least one relationship between a first correlation product of an early code phase delayed version of the code replica and the received signal, a second correlation product of a prompt code phase delayed version of the code

replica and the received signal, and a third correlation product of a late code phase delayed version of the code replica and the received signal. Instead, Meehan first processes the cross-correlation products to obtain a cross-correlation function, which is weighted and used in the equation $W_L(I_L - kI_P)/I_P$. Because Meehan fails to teach or suggest the invention of claim 41, Applicants respectfully submit that claim 41 is not anticipated by Meehan.

Dependent claims 42-52 include further limitations on claim 41. Applicants therefore respectfully submit that claims 42-52 are likewise allowable over the prior art.

Independent claim 53 recites detecting a multipath error in the received GPS signal based on at least one relationship between a first correlation product of the received GPS signal with a first PN code phase delayed replica, a second correlation product of the received GPS signal with a second PN code phase delayed replica, and a third correlation product of the received GPS signal with a third PN code phase delayed replica. Meehan fails to teach or suggest this limitation of claim 53. Instead, Meehan teaches detecting delay tracking error using the equation stated above that includes cross-correlation functions and constant weighting factors. Therefore, Applicants respectfully submit that the invention of claim 53 is not anticipated by Meehan.

Dependent claims 54-64 include further limitations on claim 53. Applicants therefore respectfully submit that claims 54-64 are likewise allowable over the prior art.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that claims 30-64 are in condition for allowance. The allowance of the claims is requested. The Examiner is invited to call the undersigned if there are any issues that remain to be resolved prior to allowance of the claims.

AUTHORIZATION TO CHARGE DEPOSIT ACCOUNT

Please charge deposit account 501914 for any fees due in connection with this Office
Action response.

Respectfully submitted,

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Barbara B. Courtney, Reg. No. 42,442
Tel. 408-236-6647